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Prevalence of Dysmenorrhea and Its Effect on the Quality of a Female's Life

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ABSTRACT

Dysmenorrhea, a common gynecological complaint among young females, manifested with severe pain in 36.6% (117/320) of participants and moderate-to-severe quality of life (QoL) impairment in 74.2% (222/320) among female medical students in Khyber Pakhtunkhwa, Pakistan. This cross-sectional study utilized non-random convenience sampling to enroll 320 participants, who completed a reliable self-structured questionnaire (Cronbach's α = 0.72). Associations between dysmenorrhea factors and QoL domains (mild, moderate, severe) were evaluated using Pearson chi-square tests. No significant association was observed between menstrual pain intensity and QoL ($\chi2$=25.932, df = 20, p = 0.168). In contrast, breakfast skipping showed a strong association with QoL ($\chi2$=12.958, df = 2, p = 0.002). Associated symptoms ($\chi2$=24.289, df = 10, p = 0.007) and irregular menstrual cycles ($\chi2$=7.429, df = 2, p = 0.024) also demonstrated significant links, highlighting lifestyle and symptom clustering effects. These findings underscore that QoL burdens stem primarily from modifiable factors beyond pain severity alone. Targeted non-pharmacological interventions—such as nutritional education to encourage breakfast consumption and proactive symptom management—are recommended to mitigate dysmenorrhea's impact and enhance well-being in this population.

Keywords: Dysmenorrhea; quality of life; menarche; prevalence; menstruation disturbances; Medical Students

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INTRODUCTION

Primary dysmenorrhea, defined as painful menstruation in the absence of identifiable pelvic pathology, is one of the most common gynecological complaints among women of reproductive age (1,2). It typically begins within 6–24 months after menarche and is characterized by cramping lower abdominal pain that may radiate to the back or thighs. The underlying mechanism involves increased production of endometrial prostaglandins through the cyclooxygenase pathway, resulting in uterine hypercontractility, reduced uterine blood flow, ischemia, and stimulation of pain receptors (2–4). In addition to pain, systemic symptoms such as nausea, vomiting, diarrhea, fatigue, headache, and sleep disturbance frequently occur (5,6).

Globally, the prevalence of dysmenorrhea ranges from 16% to 91%, with moderate to severe pain reported in approximately 40–70% of affected individuals (4,7–9). Among university students, prevalence estimates often exceed 70%, reflecting the vulnerability of this age group (10–12). In South Asian populations, similarly high rates have been documented (2,13,14). Such wide variation is attributed to differences in pain perception, cultural attitudes, and study methodologies.

Several risk factors have been consistently identified in the literature. Early menarche, heavy menstrual bleeding, positive family history (reported in up to 60% of cases), premenstrual syndrome (40–70%), nulliparity, stress, irregular sleep patterns, smoking, and dietary habits have all been associated with increased risk (4,9,15–19). Protective factors include regular physical activity, balanced diet, and hormonal contraceptive use (20–22). However, the contribution of modifiable lifestyle behaviors to quality of life impairment remains insufficiently explored in many low- and middle-income settings.

Dysmenorrhea significantly affects quality of life (QoL), a multidimensional construct encompassing physical health, psychological well-being, and social functioning. Studies using standardized instruments such as SF-36 and WHOQOL demonstrate significantly lower scores in bodily pain, vitality, and emotional domains among women with moderate to severe dysmenorrhea (23–28). Among university students, menstrual pain has been associated with absenteeism rates ranging from 20% to nearly 50%, impaired academic concentration, and reduced participation in daily activities (29–31). Furthermore, gastrointestinal and neurological symptoms accompanying dysmenorrhea may compound functional limitations (12,32,33).

Despite the high prevalence and documented impact, dysmenorrhea is often normalized culturally, leading to delayed care-seeking and under-recognition of its broader psychosocial burden (34,35). Importantly, while many studies emphasize pain intensity as the primary determinant of reduced QoL, emerging evidence suggests that symptom clustering and lifestyle factors may independently influence overall well-being (12,20,32,33).

In Pakistan, most available research has focused on prevalence estimates and pharmacological management, with limited evaluation of lifestyle behaviors and their relationship with quality of life

among medical students. Given the demanding academic environment and irregular routines in this population, understanding these associations is particularly relevant.

Therefore, this study aimed to determine the prevalence and severity of dysmenorrhea and to examine its association with lifestyle factors, menstrual characteristics, and quality of life among female medical students in Khyber Pakhtunkhwa, Pakistan. By evaluating both pain-related and modifiable factors, this study provides region-specific evidence to guide targeted, non-pharmacological interventions.

METHOD

The study employed a cross-sectional design over six months among female medical students in Khyber Pakhtunkhwa universities. Sample size was calculated using the Cochran formula with the following assumptions: expected prevalence of dysmenorrhea = 80% (based on prior studies), margin of error = 5%, confidence level = 95%. (sample size >300 via Cochrane formula). Non-random convenience sampling was used, which may introduce selection bias toward accessible participants The study's inclusion criteria specifically targeted female participants who had experienced dysmenorrhea at any point in their lives. Stringent exclusion criteria were applied to maintain the study's integrity. Participants who did not provide consent, those encountering language barriers, and individuals unable to respond to the study's inquiries were omitted. Additionally, uncooperative patients were also excluded from the study, ensuring the credibility of the amassed data.

Questionnaire

A self-administered, self-structured questionnaire (developed via literature review; Cronbach's $\alpha = 0.72$ for internal reliability) in English covered sociodemographics, lifestyle/emotional factors, and menstrual patterns.

Ethical Approval

Ethics approval was obtained from the Institutional Review Board (IRB) of Rawalpindi Medical University (Ref. Letter No: PH-46-45).

Data Collection

The questionnaire was distributed both electronically and physically to every participant and collected on the same day to ensure confidentiality and prevent information contamination. Sociodemographic information, including age and annual household income, was first collected. Anthropometric data, including body mass index (BMI), were self-reported; participants were subsequently classified into 4 groups: underweight (BMI < 18), normal (18 to 25), overweight (25 to 30), and obese (BMI> 30).

Menstrual information, including age at menarche, cycle regularity, maternal history of dysmenorrhea, and menstrual pain, was also collected. Primary dysmenorrhea was identified based on the question, “On a scale from 0 to 10, please indicate the intensity of pain, with 0 (no pain), 10 (worst pain imaginable), 1-3 (mild), 4-6 (moderate), and 7-10 (severe) pain?” and, “Do you have the following diseases or symptoms?” Participants who experienced 1 or more of menstrual cramps or abdominal pain

had to answer additional questions about the moment at which pain is perceived, the duration of dysmenorrhea, and the pain symptoms they experienced. Pain symptoms included lower abdominal pain, dizziness, headache, nausea, vomiting, fatigue, diarrhea, insomnia, and irritability in this study.

Lifestyle habits included smoking, alcohol drinking, caffeine consumption, physical exercise, sleep duration, and skipping breakfast. Physical exercise was defined as < 2 days, 30 minutes/week, or >= 2 days, 30 minutes/week, or no exercise. Sleep duration was used to classify the participants into the following groups (less than 5 hours, 5-6 hours, 7 hours, and more than 7 hours) based on the recommendations for the optimal amount of sleep for adolescents. Emotional problems included depression symptoms and anxiety symptoms.

RESULTS

Participants' Characteristics

A total of 320 female participants were included in the study. The majority were aged 18–25 years (84.7%), followed by 25–35 years (10.6%). The average age of menarche was 13 ± 1.67 years. Most participants had a normal body mass index (BMI) (70.3%), while 14.4% were overweight and 4.7% were obese. Detailed sociodemographic and menstrual characteristics are presented in **Table 1**. **Table 1** summarizes participant demographics, menstrual characteristics, lifestyle habits, associated symptoms, and quality of life categories. Most participants reported regular menstrual cycles (83.1%) and a menstrual bleeding duration of 4–6 days (66.9%). Approximately 36.3% of participants reported severe menstrual pain.

Table 1. Summary of Participant Characteristics and Dysmenorrhea-Related Factors (N = 320)

Category	Variable	Subgroup	n (%)
Demographics	Age group	<18 years	7 (2.2%)
		18–25 years	271 (84.7%)
		25–35 years	34 (10.6%)
		35–45 years	8 (2.5%)
	Family income	Rs 5000–24,000	27 (8.4%)
		Rs 25,000–49,000	43 (13.4%)
		Rs 50,000–74,000	34 (10.6%)
		Rs 75,000–1,00,000	53 (16.6%)
		>1,00,000	133 (41.6%)
		Not employed	30 (9.4%)
Menstrual Characteristics	Age at menarche	9–11 years	33 (10.3%)
		12–14 years	227 (71.0%)
		15–18 years	59 (18.4%)
		≥23 years	1 (0.3%)
	Menstrual regularity	Regular	266 (83.1%)
		Irregular	54 (16.9%)
	Cycle length	<23 days	24 (7.5%)
		23–27 days	143 (44.7%)
		27–35 days	120 (37.5%)

Category	Variable	Subgroup	n (%)
		>35 days	33 (10.3%)
	Bleeding duration	<2 days	3 (0.9%)
		2–3 days	51 (15.9%)
		4–6 days	214 (66.9%)
		>6 days	52 (16.3%)
	Sanitary pad use/day	3 pads	266 (83.1%)
		4–7 pads	51 (15.9%)
		>7 pads	3 (0.9%)
	Duration of pain	1–2 days	178 (55.6%)
		3 or more days	67 (20.9%)
		Pain before menstruation	32 (10.0%)
		8–72 hrs during menses	43 (13.4%)
Lifestyle	Physical activity	No exercise	194 (60.6%)
		<2 days/week	79 (24.7%)
		≥2 days/week	47 (14.7%)
	Breakfast habit	Regular	236 (73.8%)
		Skipped	84 (26.3%)
	Sleep duration	<6 hours	38 (11.9%)
		6–7 hours	184 (57.5%)
		>7 hours	98 (30.6%)
	Habits	Tea consumption	147 (45.9%)
		Chocolate	65 (20.3%)
		Coffee	24 (7.5%)
		Coke	21 (6.6%)
		Others	63 (19.7%)
	Chronic illness	Yes	16 (5.0%)
		No	304 (95.0%)
Symptoms	Associated symptoms	Vomiting	57 (17.8%)
		Diarrhea	54 (16.9%)
		Migraine	36 (11.3%)
		Dyspareunia	3 (0.9%)
		Infertility	3 (0.9%)
		None	167 (52.2%)
Family History	Dysmenorrhea in the family	Yes	93 (29.1%)
		No	227 (70.9%)

Menstrual Pain Characteristics and Quality of Life

Pain intensity was measured on a 0–10 numeric scale. Mild pain was reported by 21.0% of participants, moderate pain by 37.9%, and severe pain by 36.3%. The quality-of-life impact was rated as mild in 30.6%, moderate in 55.0%, and severe in 14.4% of participants.

Chi-square analysis showed no statistically significant association between menstrual pain intensity and quality-of-life categories ($\chi^2 = 25.932$, df = 20, p = 0.168). **Figure 1** illustrates the

distribution of quality of life categories across different pain severity levels and is presented for descriptive visualization only. Figure 1. Showing the crosstabulation of menstrual pain and its effect on QoL) The chi-square test shows a statistically significant association between breakfast consumption and quality of life categories (p = 0.002).

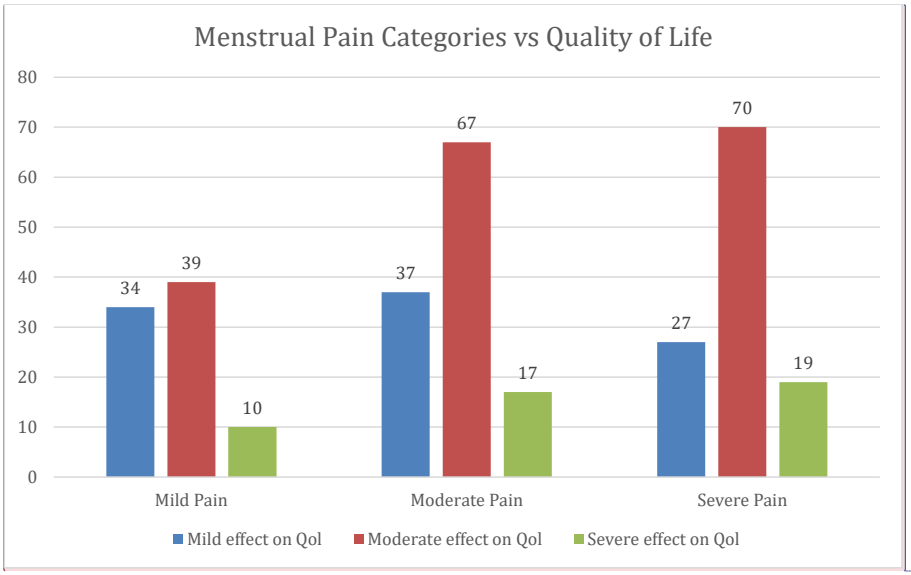

Figure 1. Distribution of quality of life (QoL) categories across menstrual pain severity.

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Lifestyle Factors and Quality of Life

A statistically significant association was observed between breakfast consumption and quality of life ($\chi^2 = 12.958$, df = 2, p = 0.002). Participants who regularly consumed breakfast were more likely to report mild or moderate QoL impairment, whereas those who skipped breakfast showed a higher proportion of severe QoL impairment. (**Table 2)**

No significant association was found between sleep duration and quality of life (p = 0.845). Similarly, BMI categories were not significantly associated with QoL outcomes. (**Table 2)**

Menstrual Regularity and Associated Symptoms

Menstrual cycle regularity showed a significant association with quality of life ($\chi^2 = 7.429$, df = 2, p = 0.024). Participants with irregular cycles were more likely to report worse QoL outcomes. Additionally, the presence of dysmenorrhea-associated symptoms such as diarrhea, vomiting, and migraine demonstrated a significant association with poorer quality of life ($\chi^2 = 24.289$, df = 10, p =

0.007). The association between dysmenorrhea severity and selected demographic, menstrual, and lifestyle characteristics is presented in **Table 2.**

Table 2. Association of Dysmenorrhea Severity with Demographic, Menstrual, and Lifestyle Factors.

Characteristic	Mild n (%)	Moderate n (%)	Severe n (%)	χ^2	p-value
Age (years)				9.15	0.165
18–25	83 (84.7)	155 (88.1)	33 (71.7)		
≥25	15 (15.3)	21 (11.9)	13 (28.3)		
Family income status				9.46	0.489
≤50,000 PKR	35 (35.7)	53 (30.1)	16 (34.8)		
>50,000 PKR	63 (64.3)	123 (69.9)	30 (65.2)		
BMI category				1.86	0.932
Underweight	10 (10.2)	20 (11.4)	4 (8.7)		
Normal	72 (73.5)	119 (67.6)	34 (73.9)		
Overweight/Obese	16 (16.3)	37 (21.0)	8 (17.4)		
Menstrual regularity				7.43	0.024
Regular	88 (89.8)	145 (82.4)	33 (71.7)		
Irregular	10 (10.2)	31 (17.6)	13 (28.3)		
Menstrual bleeding duration				8.37	0.592
≤5 days	56 (57.1)	96 (54.5)	28 (60.9)		
>5 days	42 (42.9)	80 (45.5)	18 (39.1)		
Duration of menstrual pain				15.48	0.116
≤2 days	55 (56.1)	97 (55.1)	26 (56.5)		
>2 days	43 (43.9)	79 (44.9)	20 (43.5)		
Family history of dysmenorrhea				0.87	0.649
Yes	25 (25.5)	54 (30.7)	14 (30.4)		
No	73 (74.5)	122 (69.3)	32 (69.6)		
Breakfast habit				12.96	0.002
Eating	81 (82.7)	130 (73.9)	25 (54.3)		
Skipping	17 (17.3)	46 (26.1)	21 (45.7)		
Physical exercise				6.85	0.144
Regular (≥2 days/week)	20 (20.4)	20 (11.4)	7 (15.2)		
None	51 (52.0)	117 (66.5)	26 (56.5)		
Associated symptoms				24.29	0.007
Present	29 (29.6)	95 (54.0)	29 (63.0)		
Absent	69 (70.4)	81 (46.0)	17 (37.0)		
Use of medications				8.90	0.179
NSAIDs/hormonal	27 (27.6)	46 (26.1)	16 (34.8)		

Characteristic	Mild n (%)	Moderate n (%)	Severe n (%)	χ^2	p-value
None/other	71 (72.4)	130 (73.9)	30 (65.2)		
Sleep Duration				4.13	0.845
< 5 hours	1 (1.0)	4 (2.3)	2 (4.3)		
5-7 hours	68 (69.4)	114 (64.8)	33 (71.7)		
> 7 hours	29 (29.6)	58 (33.0)	11 (23.9)		

DISCUSSION

This cross-sectional study demonstrated a high prevalence of dysmenorrhea among female medical students in Khyber Pakhtunkhwa. Moderate pain was reported by 37.9% of participants and severe pain by 36.3%, while 69.4% experienced moderate to severe quality-of-life impairment. These findings are consistent with international reports showing prevalence rates between 60% and 90% among university populations (4,7,8,10,11,38).

Interestingly, although a considerable proportion of participants reported severe pain, no statistically significant association was observed between pain intensity and quality-of-life categories ($\chi^2 = 25.932$, $p = 0.168$). This finding contrasts with previous studies demonstrating a direct correlation between higher pain severity and poorer QoL scores (23–28). One possible explanation may relate to cultural normalization of menstrual pain, leading individuals to adapt their routines despite discomfort (34,35). Additionally, coping mechanisms, peer support systems, or differential pain tolerance may moderate the relationship between reported pain intensity and perceived life impairment.

In contrast, several modifiable factors demonstrated significant associations with quality of life. Skipping breakfast showed a strong association with poorer QoL outcomes ($\chi^2 = 12.958$, $p = 0.002$). Nutritional habits may influence prostaglandin synthesis, inflammatory mediators, and energy regulation, thereby affecting symptom severity and functional capacity. Previous research has linked dietary patterns and meal regularity to menstrual symptom intensity (18,19,38). These findings suggest that lifestyle behaviors may exert measurable effects independent of pain scale ratings.

Menstrual irregularity was also significantly associated with poorer QoL ($\chi^2 = 7.429$, $p = 0.024$). Irregular cycles may reflect hormonal dysregulation within the hypothalamic–pituitary–ovarian axis, potentially increasing prostaglandin production and symptom variability (4). Similar associations have been reported in cross-sectional studies among university students in multiple regions (16,17).

Additionally, the presence of associated symptoms such as diarrhea, vomiting, and migraine demonstrated a significant relationship with lower QoL ($\chi^2 = 24.289$, $p = 0.007$). These symptoms likely amplify functional impairment by adding systemic discomfort to localized pelvic pain. Prior studies have shown that gastrointestinal and neurological manifestations significantly increase academic absenteeism and emotional distress (12,29–33).

No significant associations were found between sleep duration and QoL in our study ($p = 0.845$). While some literature suggests that poor sleep exacerbates menstrual pain through inflammatory

pathways and central pain sensitization (39), objective sleep studies have shown inconsistent physiological changes (40). The lack of association in our findings may reflect the relatively homogeneous age group or reliance on self-reported sleep duration rather than validated sleep quality scales.

Similarly, BMI did not demonstrate a statistically significant relationship with QoL outcomes. Although obesity has been proposed as a contributing factor to menstrual disturbances through inflammatory and endocrine mechanisms (4), evidence remains inconsistent across populations.

Taken together, our findings suggest that the quality-of-life burden of dysmenorrhea may extend beyond pain intensity alone. Symptom clustering, menstrual irregularity, and modifiable lifestyle factors such as breakfast consumption appear to play a meaningful role. These results emphasize the importance of comprehensive menstrual health strategies that incorporate nutritional guidance, symptom recognition, and educational interventions rather than focusing solely on analgesic use.

Strengths of this study include a structured assessment of pain severity and the evaluation of multiple lifestyle and menstrual variables. However, limitations include the cross-sectional design, convenience sampling, and reliance on self-reported data, which may introduce recall bias and limit causal inference.

Overall, this study contributes context-specific evidence demonstrating that dysmenorrhea-related quality-of-life impairment among medical students is influenced by a combination of clinical and modifiable factors. Interventions targeting dietary habits and early identification of symptom clusters may represent practical, low-cost strategies for improving well-being in this population.

CONCLUSIONS AND RECOMMENDATIONS

Dysmenorrhea is highly prevalent among female medical students in Khyber Pakhtunkhwa and is associated with substantial quality of life impairment. While pain intensity alone was not significantly associated with QoL, menstrual irregularity, associated symptoms, and certain lifestyle behaviors were statistically significant. These findings suggest that dysmenorrhea-related quality of life burden may extend beyond pain severity and highlight the importance of addressing modifiable factors within student populations. Educational initiatives focusing on menstrual health awareness and symptom recognition may be beneficial. Future studies employing longitudinal or interventional designs are needed to clarify causal relationships and evaluate targeted non-pharmacological strategies.

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